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# All Experimenters' Meeting

## Mu2e Status

K. Byrum

Electrical Integration Team Leader

5/23/16

# Overview

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- **CD-3c Review** (Jun 14-16, 2016)
  - **Directors Review**
    - **Design Reviews**
      - **Grounding & Shielding Review**
        - **Construction Readiness Reviews**
          - **Reviews**
            - **Reviews**
              - **Reviews**

# Director's CD-3c Review of Mu2e

## April 19-21, 2016

### REVIEW COMMITTEE PARTICIPANTS

**Mu2e** Fermilab | U.S. DEPARTMENT OF ENERGY

Fermilab: Home | Help | Press Room | Phone Book | Fermilab at Work

**Director's CD-3c Review of Mu2e**  
April 19-21, 2016

**Review Documentation Home Page**

The Mu2e experiment has prepared a **Technical Design Report (TDR)** describing a world-class facility to search for the charged-lepton-flavor-violating process of a muon converting to an electron in the field of a nucleus and to provide discovery sensitivity to a broad array of new physics models. This review is in preparation for a DOE CD-3c Review scheduled for June 14-16, 2016.

For assistance in obtaining any documentation, references, etc., please contact [cd3cwebmaster@fnal.gov](mailto:cd3cwebmaster@fnal.gov). For document content questions, please contact the appropriate L2 manager (see [Project Contact List](#)).

**ON THIS PAGE** | [Change](#) | [Overview](#) | [Design Reviews](#) | [Past DOE Reviews](#) | [Documents Posted During Review](#)

**Review Information**

Title	Rev-doc	Title	Rev-doc
Review Charge	<a href="#">PDF</a>	Review Agenda	<a href="#">PDF</a>
Review Committee Members	<a href="#">Here</a>	ReadyTalk Info for Plenary & Coseout	<a href="#">Here</a>

**Overview Documents**

Title	Mu2e-doc-#	Title	Mu2e-doc-#
Technical Design Report	4299		
Mu2e FNAL Organization chart	<a href="#">PDF</a>	Mu2e Project/Collaboration Org Chart	<a href="#">PDF</a>
Contingency Rules	452	Mu2e Acronyms	131
WBS Dictionary	4300	Milestone Dictionary	4301
Gantt Chart	4315	Critical Path	4316
Monthly EVMS Performance Report	7010	Baseline Schedule	4998
Change Request Log	4500	Mu2e Risk Register	4320
Design Reviews in Mu2e	5061	Design Completion Definition Document	6400

**Documents from Design Reviews**

Title	Mu2e-doc-#	Title	Mu2e-doc-#
Replies to Recommendations from Design Reviews	5253	Muon Beamline Vacuum System Report	7147
Resonant Extraction Design Review Report	7273	Proton Absorber Design Review Report	5472
Transport Solenoid Cryostat Design Review Report	7105	Transport Solenoid Design Review Report	4970
Cryo Distribution System Design Review Report	7220	Field Mapping System Design Review Report	6667
Cosmic Ray Veto Design Review Report	6949	Tracker Design Review Report	7039
Solenoid Quench Detection System Design Review Report	6706	Calorimeter Design Review Report	6833
Protection Collimator Design Review Report	6597	Trigger & DAQ Design Review Report	6377
Solenoid Power System Design Review Report	6470	Solenoid Slow Monitoring & Cryo Controls Design Review Report	6620
Target, Target Handling, HRS Design Review Report	6853	Delivery Ring Design Review Report	6861
Radiation Safety Improvements & Radiation Simulations Design Review Report	6438	External Extinction System & Extinction Monitoring Design Review Report	6350
Transport Solenoid Construction Readiness Review Report	6102	External Beamline & Accelerator Instrumentation Design Review Report	6239

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# Design Reviews

TS Coil Modules	Dec 5, 2014	Solenoid Power Supply	Dec 11, 2015
Proton Absorber	Feb 23, 2015	Solenoid Power Supply	Dec 11, 2015
Resonant Extraction	Aug 25-27, 2015	Slow Monitoring &	Jan 8, 2016
PS/DS 50% Design Review	Aug 26-27, 2015	PS/DS	Jan 12-14, 2016
TS Module Readiness Review	Sept 2, 2015	(start of 90 day	
External Beamline	Oct 6-7, 2015	DAQ Final Design Review	Jan 26, 2016
Accelerator Inst./Controls	Oct 6-7, 2015	Quench Protection	Jan 29, 2016
Radiation Safety	Oct 20, 2015	Calorimeter Final Design Review	Feb 16-17, 2016
Radiation Safety Simulations	Oct 20, 2015	CRV Final Design Review	Feb 22-23, 2016
External Extinction System	Nov 2-3, 2015	Tracker Final Design Review	Feb 29-Mar 1, 2016
Extinction Monitoring	Nov 2-3, 2015	Cryogenic feedboxes	Mar 1 2016
Target, Target Handling, HRS	Nov 16-18, 2015	Field Mapping System	Mar 4, 2016
Delivery Ring RF	Nov 19, 2015	MB Vacuum System	Mar 15, 2016
HRS Protection Collimator	Dec 14, 2015	TS Final Design Review	Mar 21-22, 2016

Final reports from design reviews are posted to web page.

# Overall Design is Mature

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Subsystem	Design Completion
Accelerator	85%
Conventional Construction	100%
Solenoids	85%
Muon Beamline	65%
Tracker	85%
Calorimeter	75%
Cosmic Ray Veto	85%
DAQ	90%
<b>Overall design</b>	<b>85%</b>

# Mu2e Grounding and Shielding

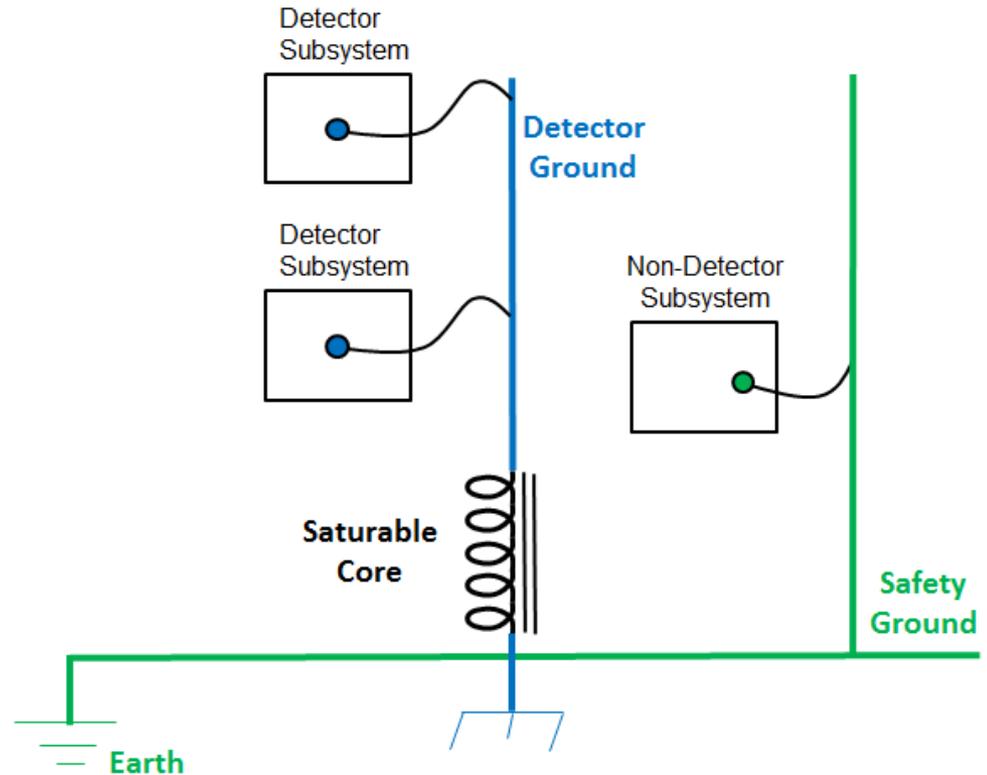
- “Basic Detector Grounding Principles” presented at Integration Meeting (with examples of Grounding and Shielding plans of other experiments (CDF, ATLAS))
- L2’s identified leads for their system/subsystems to form “Mu2e Grounding and Shielding committee”
  - K. Byrum, G. Drake, G.Ginther, S. Hansen, T. Hamernik, A. Hocker, G. Horton-Smith, D.Huffman, P.Kasper, K.Krempetz, D.Mertz, R.Rivera, I.Sarra
- Committee includes David Mertz (Lab AHJ, Electrical Safety Engineer)  
Best Practice: Integrate Safety into design from beginning
- Integration Team worked w/ Civil Construction to install grounding rods
- Subsystem leads present grounding plans (and updates) for their detector subsystem at weekly meetings; subsystem leads contribute text for their subsystem.
- Docdb 7254; **External review held on May 10, 2016**



# Integration Electrical Grounding and Shielding

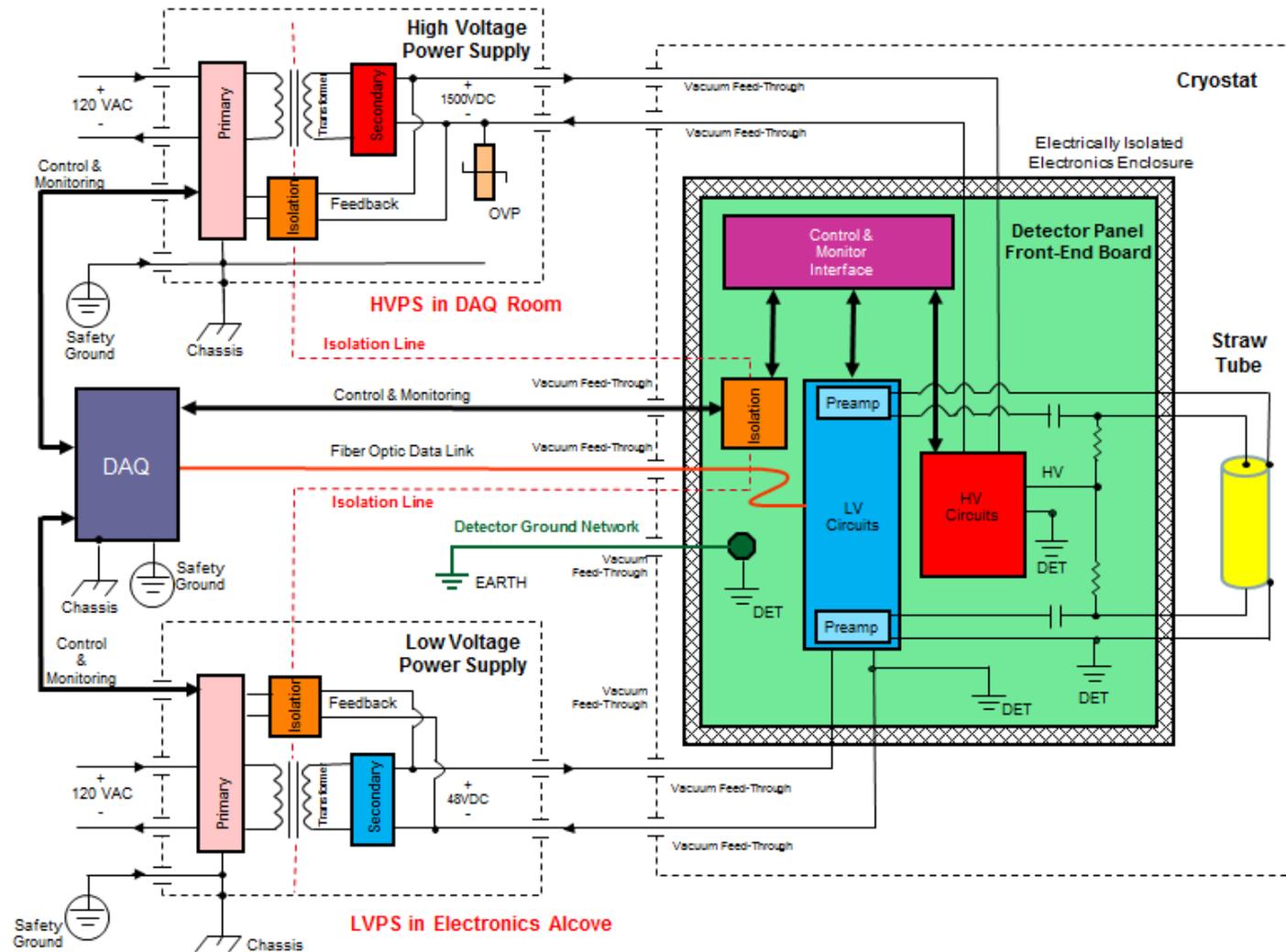
## Basic Grounding Scheme

- Signal reference on detectors will be isolated from support structure
- Reference to ground provided by Detector Ground
- Detector Ground shall form no ground loops
- Detector Ground is a separate branch from the Safety Ground structure
- Detector Ground must have a (one) connection to Safety Ground
- Many details spelled out in the document
  - Safety considerations
  - Power supplies
  - Data links
  - Monitoring & controls
  - ...



# Integration Electrical Grounding and Shielding

## Example: Tracker Subsystem



# Conventional Construction >60% Complete



# Looking North



# Cranes in Building









# Transition to Operations Task Group

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- Expect Beneficial Occupancy of the Mu2e Building in early November (11/11/16).
- Transition to Operation Group, with many individuals from the Integration Team.
- The transition and responsibilities are outlined in the Transition to Operation-Detector Building (docdb-5844).



# Summary (from Ron's Directors Review Talk)

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- Significant peer review and oversight of design and procurement process.
- Overall design 85% complete.
- Project is performing well on cost, schedule and contingency
- CD-3 documentation complete
- Recommendations from previous reviews are being addressed
- ESH&Q fully integrated into all aspects of Project
- Integration Team active and functioning extremely well

**We are ready for CD-3c: Jun 14-16, 2016**